



### Reading Guide 3.5

#### What Other Factors Contribute to the Air Quality in Los Angeles?

##### Climate Trivia

1. What part of the world sees more thunderstorms than any other?
2. True or False: Humid air is lighter than the same volume of dry air.
3. Where is the windiest place on Earth?
4. What state leads the US in tornadoes reported each year?
5. True or False: Weather means the same thing as climate.

**Read** the 1<sup>st</sup> paragraph on pg 151.

Define “climate” –

What do you think the definition of “weather” is?



##### Observe

Read the remainder of pg. 151. Use the map on page 152 to help you answer the following questions.

1. Compare the geography that is west of Los Angeles with the geography that is west of New York City. What is the same? What is different?
2. Prevailing winds in the U.S. generally blow from the west or southwest. With this in mind, compare the geography east of LA with the geography east of NYC. Where will pollutants go in each case?
3. Read the top of pg. 153. Look at the data for average daily temperatures for LA and NYC. During what time of year do you see the highest temperatures? These are the most likely times for ozone and smog. What difference do you see in the average daily temperature of LA and NYC?
4. Look at the data for average rainfall. You already know that rain cleans the air. How do you think the average rainfall in LA contributes to its pollution?

## Reflect

Why do you think the air in LA is so much more polluted than the air in NYC? Use your observations to justify your answer.

## Convection



**Observe and Analyze, Part 1 & 2**– Read the top of page 155 and then watch the video of the convection model. Sketch what you saw on the attached page using arrows to indicate the movement of the water. Watch the video a second time and label your sketch appropriately. Answer the following questions.

1. What do you think is the source of energy that heats the air in LA?
2. Imagine that the convection model was LA in the summer. What happens to the polluted air?
3. What would be different in NYC? Why?



## How Does the Convection Video Model the Air in Los Angeles?

When air near Earth's surface is warmed, its particles spread out, and the air rises. The particles of the cooler air above the warm air are packed more tightly together. This air then sinks. As the warm air rises, it cools, while the cool air close to the ground warms. Again, the warm air rises, and the cooler air sinks. The continuous process of rising and sinking air forms a pattern known as a convection current. The process of convection transfers heat through a fluid by the movement of particles.

## Observe and Analyze – Inversion , Part 1 & 2

Read the bottom of page 156 and the top of page 157. Watch the video that models thermal inversion. Sketch what you saw on the video using arrows to indicate movement of air. Watch Part 2 of the video and appropriately label your sketch.

1. On a new *Convection and Inversion* page, sketch the path of the water that you observed, and label the parts of the model.
2. **Visually** compare the water movement in this video to the water movement in the convection video.

3. Imagine that the cool water in this model represents cool air coming in to Los Angeles from the ocean, and the obstacles represent the mountains to the east, north, and south of Los Angeles. How do you think these air movements affect the air quality in Los Angeles?

3. Do you think it would be different in New York City? Why or why not?



### **Reflect**

1. Which parts of the inversion model match the geographic features of the Los Angeles region? For example, which features represent the mountains?

2. Think about the models you observed. If these models are accurate, what happens to the air of Los Angeles as it moves from west to east and bumps into the mountain range?

3. Why do you think the number of sunny days in Los Angeles affects its air pollution?



**Read and Reflect** - page 158 and 159. Answer the following questions with your group.

1. Why do you think warm air rises? To answer, use what you know about gases, mass, behavior of molecules, and temperature.

2. Geography and frequent thermal inversions cause Los Angeles to have the worst air quality in the United States. What factors cause Los Angeles to have frequent thermal inversions?

3. What do you think a community can do to decrease air pollution during thermal inversions?

4. Do you think your community experiences thermal inversions? Why or why not? If your community does not have thermal inversions, describe the factors in your community that prevent inversions.

**Explain** – You will now explain the causes of poor air quality in LA. A good explanation will describe how the geography, pollutants, and climate of LA act together to cause air pollution. You will use a *Create Your Explanation* page.

### **Update the Project Board**

Use the *Project Board* to record what you have learned about convection and inversion in the *What are we learning?* column. Include what you know about thermal inversion and the effect of inversions on air pollution, especially in Los Angeles. Record your evidence in the *What is our evidence?* column.

**What's the Point** – Summarize what you learned in 3.5

